

# AIR POLLUTION AND AIRWAY INFLAMMATION: A TIME LAG BETWEEN NO<sub>2</sub> AND O<sub>3</sub>

**Su Ryeon Noh**, *School of Public Health, Seoul National University, Seoul, Republic of Korea*

**Sujin Park**, *Korea Forest Research Institute, Seoul, Republic of Korea*

**Domyung Paek**, *School of Public Health, Seoul National University, Seoul, Republic of Korea*

**Background and Aims:** Although studies have demonstrated that air pollution is associated with adverse health effects, little is thought about a time lag, particularly between NO<sub>2</sub> and O<sub>3</sub>. Ozone is a secondary pollutant produced by the reaction of NO<sub>2</sub> in the presence of sunlight. So we observed a time difference between NO<sub>2</sub> and O<sub>3</sub> in detail when we evaluated acute effects of air pollution on biomarkers of airway inflammation.

**Methods:** The fraction of exhaled nitric oxide (FE<sub>NO</sub>), a non-invasive measure of airway inflammation, was measured in 939 subjects. Air pollution levels were collected at a stationary monitoring site, and meteorological factors were monitored at a meteorological tower.

**Results:** NO<sub>2</sub> and O<sub>3</sub> showed a strong negative correlation. Air pollutant concentration was matched with a FE<sub>NO</sub> level on various lags adjusting age, gender, and meteorological factors. Both NO<sub>2</sub> and O<sub>3</sub> were associated with changes in the FE<sub>NO</sub>. However, NO<sub>2</sub> and O<sub>3</sub> worked in the opposite direction. When we look the lag structure, NO<sub>2</sub> effects persisted from lag 0 until lag 9, whereas O<sub>3</sub> effects remained from lag 9 up to more than lag 24, prior to FE<sub>NO</sub> testing. NO<sub>2</sub> and O<sub>3</sub> were significantly associated with 8.3% (lag 0, p<.0001) and 11.9% (lag 12, p=0.0008) higher FE<sub>NO</sub> levels over the inter-quartile range of 19 ppb and 14 ppb, respectively.

**Conclusions:** Short-term increases in NO<sub>2</sub>, a pollutant associated with traffic emissions and industry, and O<sub>3</sub>, a secondary pollutant formed by the action of sunlight on NO<sub>2</sub>, were associated with airway inflammation with an 8~12 hour difference in lag time.